

It is not so well regarded by the limb-makers, as it leaves no space in which to incorporate a mechanical knee, and the prosthesis has to be made with hinges at the sides. Patients with a Gritti-Stokes amputation walk very satisfactorily and can bear weight on their stumps indefinitely.

### THIGH

Amputations through the thigh present special problems. The stump not only serves as a lever, but the muscles intrinsic in the stump motivate it. Consequently, the higher the amputation the greater the loss of musculature and the weaker the stump will be. This is particularly true of the power of adduction, and the reason is readily apparent when one considers that the adductor muscles insert on the femur all the way down to the adductor tubercle.

The longer the thigh stump, the better that patient will walk. It is, however, necessary to remove the distal four inches of the femur in order to allow room for the housing of the mechanical knee. The site of election of an amputation through the thigh is, therefore, four inches proximal to the knee joint.

In performing an amputation through the thigh, the anterior flap is laid out longer than the posterior so that the resulting scar will not lie directly off the end of the femur. The fascia is included in the flaps. The femur and the muscles are severed in one plane. The stump is covered by fascia and skin, which are sutured as separate layers. The interposition of the fascia prevents the skin from becoming adherent to the exposed ends of the bone and muscles. Postoperatively, a flexion con-

tracture is prevented by holding the stump in a neutral position during the healing. Exercises are instituted to strengthen and to increase the range of motion of the stump.

### FOREARM

Much has been written about the present day artificial arms, and there certainly is great room for improvement. However, the sense of touch, which is so important in the natural hand, cannot be imparted to any artificial hand. Also, the hand is a much more delicate mechanism than the foot and is proportionately more difficult to replace.

One advance was made near the end of the war in amputations through the forearm. Prostheses were devised which utilized pronation and supination. Amputation surgery has been modified to meet this development. The pronator quadratus muscle is preserved, together with the distal articulation between the radius and the ulna. In order to taper the stump so that the prosthesis can be fitted on over the end, it is advisable to remove the styloid process of the ulna and to bevel the lateral flare of the radius. It is also well to remove the articular cartilage from the end of the radius. Such a stump will be rather long but will preserve the full function of pronation and supination.

A double arm amputee will become highly proficient in the use of his artificial arms through sheer necessity. A single arm amputee will, however require considerable training to develop reliance on his prosthesis, and lacking that training, he will be apt to discard his artificial arm.

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## Maternal, Fetal and Neonatal Mortality\*

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I THOUGHT that it might be of interest to this group to consider the end-results which have been accomplished in the field of Obstetrics in the last ten or fifteen years, to examine the causes for these accomplishments, and to consider in what ways even better results might be achieved. The object of the procedures which are carried out in the care of prospective mothers, in their deliveries, and in the care of their newborn children is to afford the greatest possible assurance that avoidable complications will be reduced to the minimum, that as many mothers as possible will be carried through their pregnancies safely, and that their newborn children will be treated so skilfully that the neonatal death rate will be brought as near as possible to the irreducible minimum of inevitably fatal con-

ditions. With regard to maternal mortality, which is the measure of the efficiency of our efforts in obstetrics, this country occupied a rather unenviable position until recent years. The United States was far down the list with respect to its maternal mortality rate. (Table 1.)

TABLE 1.—*Comparison of Maternal Mortality in the United States and Certain Foreign Countries (1932)*

Country	Maternal Deaths Per 10,000 Live Births
Australia .....	56
Belgium .....	48
Canada .....	50
Chile .....	70
Denmark .....	35
England .....	42
Italy .....	30
Netherlands .....	30
New Zealand .....	41
Norway .....	26
Scotland .....	63
Sweden .....	27
United States .....	63

\* Chairman's address. Read before the Section on Obstetrics and Gynecology at the Seventy-fifth Annual Session of the California Medical Association, Los Angeles, May 7-10, 1946.

However, within the last ten years the rate has been constantly dropping in a perfectly remarkable fashion. The accompanying table shows this drop graphically. (Table 2.) Happily, the California maternal mortality rate has kept pace with this general improvement—and indeed California's rate is now much lower than the general average for the nation and is better than that for all except 12 other states. (Table 3.) Likewise the infant mortality rate has been constantly dropping. (Table 4.) Indeed, much of the increase in the average span of life—so widely heralded these days—is due to the elimination of many of the infant deaths which formerly occurred.

While all of the reasons for this improvement in results are not entirely clear, some of them are fairly certain. Discussion of them might well prove profitable because of their implications with regard to the maintenance of our present high standards and also with regard to future improvement.

TABLE 2.

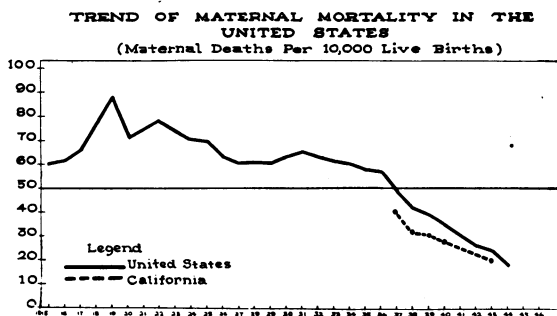


TABLE 3.—Maternal Mortality—By States (1943)

State	Number of Deaths Per 1,000 Live Births
Minnesota	1.4
Oregon	1.5
Wyoming	1.5
Connecticut	1.6
South Dakota	1.6
Utah	1.6
Washington	1.6
Iowa	1.7
Nebraska	1.7
Maryland	1.8
Montana	1.8
New Jersey	1.9
California	2.0
Indiana	2.0
Massachusetts	2.0
Nevada	2.0
Wisconsin	2.0
South Carolina	4.4
New Mexico	4.7

12 Ahead of California

TABLE 4.—Trend of Infant Mortality in the United States  
Deaths Per 1,000 Live Births

	United States	California
1940	47.4	39.6
1941	45.9	37.2
1942	41.2	35.9
1943	40.7	35.1
1944	39.2	
1945	38.1	

In my opinion the most important factor in the drop of the maternal mortality rate, and probably also of the fetal and neonatal rates, is education. More specifically I refer to the present system of educating doctors after they have graduated from medical school, *the modern system of resident training*. Within the last twenty years there has gradually grown up in most of our medical schools, and in many first-class hospitals not associated with medical schools, a system of resident training in the various branches of medicine. This training involves specialization early in one's career, under the guidance of first-class men. Not infrequently four, five, or even seven years are necessary to complete the training. The men turned out are truly finished products. This is not to say that superior men are not produced in other ways, but it is my contention that this system, as an overall policy, has resulted in more well-trained men being turned out than any other system could produce. This has gradually had its effect, not only with regard to the brand of medicine practiced by the individual men themselves, but also with regard to the influence these men have had upon the type of medicine practiced about them. In this way there has been a gradual elevation in standards. The place of the well-qualified specialist has become recognized in the community, and there has grown up a demand for the type of knowledge which he represents. For instance, in the obstetrical field it is now the policy of many hospitals not to permit Cesarean sections without consultation with duly qualified specialists. Many hospitals go even further than this. It is such policies as these which have been established because of the presence of well-qualified men in the community.

The various specialty boards are a reflection of the recognition of the need for proper qualification in the various branches of medicine. The specialty boards might also be cited as a cause for our present improved mortality rates. The mere possession of a board certificate is, of course, of very little importance as such; what is important is the qualifications which they demand, and which young graduates of medicine are seeking more and more. The modern resident in the field of obstetrics, or pediatrics, the two fields of medicine with which we are concerned today, has been well grounded in the basic pathology of his particular branch of medicine; he has received careful and extensive tutorial instruction in the management of the common clinical problems which are likely to be encountered in everyday practice, as well as in the majority of the complications to be seen in his branch of medicine. Perhaps even more important, he has had an opportunity of shouldering the responsibility for the care of patients, and of carrying out the actual procedures involved in their care. It is well known, of course, that the way to learn to do a thing is to do it. These men have been given the opportunity to do. Is there any wonder then that the influence of such training is beginning to be felt? Unfortunately,

the war played hob with the resident system, in that the training in the various special branches of medicine was usually interrupted by a call to military service long before the individual men had completed their services. Possibly this was necessary. Nevertheless, it is devoutly to be hoped that a speedy return to the resident system of training can be realized now that the war is over.

As a corollary to this type of education, there has grown up a widespread interest in improved maternity care and in the whole subject of the preventability of maternal mortality. Studies have been made which have pointed out valuable lessons. Many hospitals have learned to review their results—and as a consequence more frequent and competent consultation has been demanded when operative procedures have been contemplated. These factors have unquestionably had a desirable effect upon maternal and fetal mortality rates. The worst obstetrical results have been obtained in those hospitals in which poor or no records were kept, staff meetings were infrequent, and consultations were not demanded. While such institutions are becoming scarcer, there is still much room for improvement in this respect.

Another potent factor in the reduction of maternal mortality has been the introduction of the sulfonamides and penicillin into the practice of medicine. Infection has always been, and still remains, the most important single cause of maternal deaths. I think that there is little doubt that modern chemotherapy is gradually reducing both maternal and fetal mortality from infection. It is not in the form of spectacular results that this has been accomplished, for we still see cases of full blown infections which are affected not a whit by these agents, but it is in the sphere of the prevention of serious infection that the sulfonamides and penicillin have been of special value. It is to be hoped that this value will be felt more and more as these agents are more widely and skilfully used. It has been shown, for example, that penicillin given to the mother is transmitted through the placenta to the fetus. Its more widespread use in prolonged labors, after premature rupture of the membranes, or where definite infection exists in the birth canal may well prevent many a fetal death as well as a serious maternal complication.

A third important factor in the reduction of maternal mortality is the more widespread use of blood in combating shock and in replacing blood loss. Shock and hemorrhage have been among the foremost causes of death—yet it has been abundantly shown that death has rarely resulted from these causes if proper preparations have been made for transfusion wherever a critical situation has existed, and wherever transfusions have actually been carried out before extreme states of exsanguination or shock have been reached. Timely transfusion has done much to reduce the mortality in such conditions as ruptured ectopic pregnancy, placenta previa, and

postpartum hemorrhage—to say nothing of its value in combating the infection which so often follows severe blood loss. The modern blood banks are playing now, and are going to play in the future, a large role in the prevention of maternal deaths.

There are many factors responsible for the reduction of fetal and neonatal mortality; more adequate antenatal care with all that it implies, especially the better management of the toxemias of pregnancy, the more careful use of operative vaginal delivery, a better appreciation of the dangers of analgesia, better methods of resuscitation, and perhaps most important of all, a better appreciation of the problems of the first few weeks of life. The latter can probably be ascribed largely to the resident system of training which we have already discussed. The largest single cause of neonatal mortality is prematurity. While the more skilful use of oxygen, the maintenance of body temperature through the use of incubators and properly heated nurseries, the maintenance of fluid balance, and the use of blood have done much to reduce neonatal mortality in premature infants, there still remains much to be accomplished here, not only in the prevention of prematurity but also in its management.

I have reviewed briefly for you what I consider to be the most important factors in the rather remarkable improvement in maternal and fetal mortality which has occurred in the last ten years. Without doubt there are other factors involved, some of which are obvious, and others of which are as yet quite obscure. Should we, now, congratulate ourselves and rest on our laurels? The answer, of course, is no. What then are the problems for the future? Just where should we attack? I do not wish today to becloud the issue with nebulous suggestions, but rather to discuss briefly the more outstanding issues.

First of all it would seem of the greatest importance to continue the development of the resident system which has already done so much. Young men in medicine should be encouraged to qualify themselves well in their chosen fields of medicine. Since this is a time-consuming and expensive program, it may become necessary to provide financial subsidy. Perhaps the various large medical foundations should be encouraged to contribute funds for such purposes; perhaps this is the means whereby the state and federal governments should make their contributions to the health of the nation. An even greater extension of post-graduate education should be fostered, so that relatively short, practical courses could be made available to all medical men who wished to refresh their knowledge. Perhaps subsidies would be needed for these purposes also. Indeed, some states already subsidize such programs.

Hospital standards should be elevated and made more uniform. This might be difficult to

achieve, though I have the feeling that if enough well qualified doctors were turned out into the various communities, good hospital standards would follow inevitably. They would have to; they would be demanded. Such a spread in good standards, with its demand for proper consultation, would inevitably result in a drop in the incidence of ill-advised and unwarranted operative procedures, with an immense saving in maternal and fetal lives. Since most infections are the result of poorly conducted labors in which the final event is an operative procedure, the furtherance of good hospital standards with all that this connotes is a direct attack upon this problem.

Possibly for the more remote smaller communities a consultation service is needed. This should not be too difficult to set up. I feel sure that the well-trained men all over the country would be only too glad to contribute a period of their time to such a service.

The importance of thorough and complete antenatal care must continue to be recognized; its virtues should be publicized even more than at present. For example, toxemia of pregnancy is responsible for one of the largest proportions of maternal and fetal mortality. It is in the prevention of toxemia and in the circumventing of its more serious forms that adequate and widespread antenatal care would prove a direct means of lowering our present mortality rate.

The value of blood transfusions must be con-

stantly emphasized, and we must seek to make blood available wherever pregnant women are being cared for. More blood banks must be established, especially for the smaller communities. What a boon this would be! This would be a direct attack upon the large segment of maternal deaths which still occur because of shock and hemorrhage.

Finally, the problem of prematurity must be tackled more vigorously. We are cognizant of many of the causes of prematurity—such as toxemia of pregnancy and placenta previa. The proper management of these conditions would do much to prevent many premature labors. In other instances we are still without an explanation, and herein lies a direct challenge to investigators in this field of medicine. Inevitably, really significant improvement in this field lies in the direction of prevention, though there is much yet to learn regarding the care of the premature newborn infant.

In this brief dissertation I have attempted to pick out those factors in maternal mortality which are susceptible of improvement, and to point out the general principles by which such improvement might be achieved. A group such as this, all men and women interested in good obstetrical care, can contribute much to the future by supporting these principles. Each of us, in our own communities, can accomplish a great deal by working on these problems directly with the tools at hand.

## Pyelitis of Pregnancy\*

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PHYSIOLOGICAL changes of some degree occur in the urinary tract in almost all pregnancies. These changes are loss of ureteral muscle tone, diminution of ureteral peristalsis, ureteral dilatation and hydronephrosis. There may or may not be impairment of renal function.

These physiological changes usually begin during the fourth month of pregnancy, are more marked on the right side, progress rapidly during the fifth and sixth months of pregnancy, may occasionally regress to some degree during the last two months of pregnancy. However, the physiology of the urinary tract may not return to normal until as late as the sixth or seventh week after delivery.

Since Cruveilhier in 1843, first described dilatation of the ureters as a frequent accompaniment of pregnancy, the anatomical, physiological and pathological changes in the urinary tract during gestation have been investigated in considerable

detail and a great wealth of data has been compiled. It would be impossible to mention all the more outstanding investigators in this field, but we must name Traut<sup>3</sup> and his associates, Hundley<sup>2</sup> and his co-workers and Crabtree<sup>1</sup> and his associates, as men to whom we owe much of our present day knowledge.

Most authorities agree that there are probably several causative factors in the production of the urinary tract changes. There is much evidence to support the contention that the most important factor is pressure from the pregnant uterus. The ureteral dilatation is marked above the pelvic brim, whereas there is rarely dilatation below the pelvic brim. There is usually little if any dilatation prior to the sixteenth week of pregnancy and it is during this week that the gravid uterus rises above the pelvic brim. As further evidence, ureteral dilatation has been repeatedly observed in patients with large pelvic tumors.

Dextro rotation of the uterus, cushioning of the left ureter by the sigmoid, and the fact that the right ureter crosses the common iliac artery at a right angle while the left ureter crosses the left

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